

WHAT IS CLAIMED IS:

1. A broadband optical spectrum generating apparatus  
that generates a broadband optical spectrum, said  
5 broadband optical spectrum generating apparatus  
comprising:

a short pulse light source that emits pulsed light  
at a short interval; and

a broadband optical spectrum-generating optical  
10 fiber that has a non-linear coefficient of not less than  
10 [ $\text{W}^{-1}\text{m}^{-1}$ ] at a wavelength of the pulsed light emitted from  
said short pulse light source and converts the pulsed light  
input from said short pulse light source into the broadband  
optical spectrum.

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2. A broadband optical spectrum generating apparatus  
in accordance with claim 1, wherein said broadband optical  
spectrum-generating optical fiber has a length of not  
greater than 50 m.

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3. A broadband optical spectrum generating apparatus  
in accordance with claim 1, wherein said broadband optical  
spectrum-generating optical fiber has a magnitude of

chromatic dispersion of not greater than 2 [ps/km/nm].

4. A broadband optical spectrum generating apparatus  
in accordance with claim 1, wherein said broadband optical  
5 spectrum-generating optical fiber is a polarization  
maintaining optical fiber.

5. A broadband optical spectrum generating apparatus  
in accordance with claim 1, wherein said short pulse light  
10 source outputs the pulsed light having a central  
wavelength of output pulse in a vicinity of 1556 nm and  
a pulse width in a unit of picosecond to femtosecond.

6. A broadband optical spectrum generating apparatus  
15 in accordance with claim 1, wherein said short pulse light  
source outputs the pulsed light having a pulse width in  
a range of 10 to 100 femtoseconds and a mean output of not  
less than 20 mW.

20 7. A broadband optical spectrum generating apparatus  
in accordance with claim 1, wherein the broadband optical  
spectrum is relatively flat over a band of 1300 nm to 1900  
nm.

8. A broadband optical spectrum generating apparatus in accordance with claim 1, said broadband optical spectrum generating apparatus further comprising a lens  
5 that is interposed between said short pulse light source and said broadband optical spectrum-generating optical fiber to make the pulsed light from said short pulse light source enter said broadband optical spectrum-generating optical fiber.

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9. A pulsed light generating apparatus that generates pulsed light of a desired wavelength in a preset wavelength band, said pulsed light generating apparatus comprising:

15 broadband optical spectrum generation section comprising a short pulse light source that emits pulsed light at a short interval, and a broadband optical spectrum-generating optical fiber that has a non-linear coefficient of not less than  $10 \text{ [W}^{-1}\text{m}^{-1}]$  at a wavelength  
20 of the pulsed light emitted from said short pulse light source and converts the pulsed light input from said short pulse light source into a broadband optical spectrum; and  
optical spectrum extraction section that receives

a supply of the broadband optical spectrum from said broadband optical spectrum generation section and extracts an optical spectrum of an arbitrary wavelength from the received broadband optical spectrum.

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10. A pulsed light generating apparatus in accordance with claim 9, wherein said optical spectrum extraction section comprises a tunable filter that varies a wavelength of transmitted light.

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11. A pulsed light generating apparatus in accordance with claim 9, wherein said optical spectrum extraction section comprises an extracted wavelength regulator that regulates the extracted wavelength in  
15 response to an electric signal.

12. A pulsed light generating apparatus in accordance with claim 9, wherein said broadband optical spectrum-generating optical fiber is regulated to have a  
20 length of not greater than 50 m.

13. A pulsed light generating apparatus in accordance with claim 9, wherein said broadband optical

spectrum-generating optical fiber is regulated to have a magnitude of chromatic dispersion of not greater than 2 [ps/km/nm].

5           14. A pulsed light generating apparatus in accordance with claim 9, wherein said broadband optical spectrum-generating optical fiber is a polarization maintaining optical fiber.

10           15. A pulsed light generating apparatus in accordance with claim 9, wherein said short pulse light source outputs the pulsed light having a central wavelength of output pulse in a vicinity of 1556 nm and a pulse width in a unit of picosecond to femtosecond.

15           16. A pulsed light generating apparatus in accordance with claim 9, wherein said short pulse light source outputs the pulsed light having a pulse width in a range of 10 to 100 femtoseconds and a mean output of not  
20 less than 20 mW.

          17. A short pulse light source that is included in a broadband optical spectrum generating apparatus, which

generates a broadband optical spectrum, and emits pulsed light to a broadband optical spectrum-generating optical fiber, which converts the pulsed light into the broadband optical spectrum,

5           said short pulse light source outputting the pulsed light having a central wavelength of output pulse in a vicinity of 1556 nm and a pulse width in a unit of picosecond to femtosecond.

10           18. A broadband optical spectrum-generating optical fiber that is included in a broadband optical spectrum generating apparatus, which generates a broadband optical spectrum, and converts pulsed light input from a short pulse light source into the broadband optical spectrum,

15           said broadband optical spectrum-generating optical fiber having a non-linear coefficient of not less than 10  $[W^{-1}m^{-1}]$  at a wavelength of the pulsed light emitted from said short pulse light source.

20           19. A broadband optical spectrum-generating optical fiber in accordance with claim 18, said broadband optical spectrum-generating optical fiber being regulated to have a length of not greater than 50 m.

20. A broadband optical spectrum-generating optical fiber in accordance with claim 18, said broadband optical spectrum-generating optical fiber having a magnitude of  
5 chromatic dispersion of not greater than 2 [ps/km/nm].

21. A broadband optical spectrum-generating optical fiber in accordance with claim 18, said broadband optical spectrum-generating optical fiber being a polarization  
10 maintaining optical fiber.